Remarks/Arguments

This Amendment is being filed in response to the Official Action of the Examiner mailed April 19, 2004, setting a three-month shortened statutory period for response ending July 19, 2004. Claims 1-26 remain pending, with claims 19-26 being newly presented. Reconsideration, examination and allowance of all pending claims are respectfully requested.

On page 2 of the Office Action, the Examiner stated that the title of the invention is not descriptive. In response, the title has been amended to be more descriptive of the invention to which the claims are directed.

On page 2 of the Office Action, the Examiner rejected claim 16 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner states that claim 16 recites "said multiple velocity measurements" in lines 2-3, which lacks sufficient antecedent basis. In response, claim 16 has been amended to fully comply with 35 U.S.C. § 112, second paragraph.

On page 2 of the Office Action, the Examiner rejected claims 1-3, 7, 17, and 18 under 35 U.S.C. § 102(e) as being anticipated by Tatum et al. (US 2002/0148952). With respect to claim 1, 17, and 18, the Examiner states that it is inherent in Tatum that changes in surface textures (imperfections) cause different spikes or pulses of light reflections from the surface of the target and the monitoring of these pulse frequencies provides information on target velocity. After careful review, Applicants must respectfully disagree.

Tatum clearly does not use changes in surface textures (imperfections), which would cause different spikes or pulses of light reflections from the surface of the target. Nor does Tatum monitor these pulse frequencies to provide information on target velocity, as the Examiner suggests. Tatum uses an entirely different approach. For example, and with respect to a embodiment shown in Figure 3, Tatum states:

> [0029] As target 30 moves upward, the particular light signal received by detector 32 changes from full on (no obstruction), to half on (signal 24 blocked but not signal 22), and finally to full off (both signals 24 and 22 blocked). This happens in an essentially digital, or stepwise, fashion. A single illuminator in a similar geometry would provide only a very gradual change in detector illumination, requiring a more sophisticated algorithm to determine position at the midpoint. However, with this same VCSEL array, the identical function can be provided for target 30 moving orthogonally to that shown in FIG. 3, simply by emitting signals from apertures 6 and 8 instead of 4 and 6, for example. For detection of a diagonally-moving target, signals from apertures 4 and 8 or 6 and 10 would be emitted. Thus, multiple motions could be sensed with a single detector 32 by sequentially emitting light signals from different apertures.
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> [0030] An extension of the concept requires larger element counts. Consider a VCSEL array with 5x2 elements, for example. If a stationary target with a corrugated edge is interposed between the VCSEL array and a detector, the corrugations will block some light signals and not others. By cycling through several fixed patterns of "lit" and "unlit" VCSELs, the detector signal can be interpreted as a map of the corrugated edge. In this way the corrugated obstruction acts as a key and the optical assembly including the VCSEL array and the detector acts as a lock. Electronics known to those skilled in the art can produce locks that recognize only one or several keys. Any emission patterns that correspond in a certain way to the pattern on the target would result in a positive identification, or recognition, by the detector.

[Tatum, paragraphs 29 and 30] (Emphasis Added). As can be seen, in this embodiment, Tatum appears to identify the shape/location of an object by emitting signals from different "lit" and "unlit" patterns of VCSELs, and then detects which light signals are blocked or not blocked by the target object at any given time. Figures 4-5 of Tatum

appear to use a similar technique. As can be seen, in this embodiment, Tatum clearly does not rely on, or even use, changes in surface textures (imperfections), which cause different spikes or pulses of light reflections from the surface of the target. Nor does Tatum monitor these pulse frequencies to provide information on target velocity, as the Examiner suggests. Instead, this embodiment of Tatum appears to determine which light signals are blocked or not blocked by the target object at any given time to determine the size/location of the target.

In another embodiment, and with respect to Figure 8, Tatum state:

> [0040] In the second preferred embodiment, the timing of illuminating the individual elements is an integral part of the sensing process. The elements are serially illuminated in a sequence whose temporal characteristics are interpreted. In FIG. 8, VCSEL structure 2 is shown sequentially emitting light signals from emission apertures 4, 6, 8, and 10 in the order 4, 6, 8, 10, 4, 6, 8, 10, etc. Corresponding light signals 22, 24, 26, and 28 are, therefore, emitted from the emission apertures. In this example, three light signals have already been emitted (26, 28, 22), illustrated by the dotted lines, and one is currently lit (24). Light signal 26 has been emitted and has reached detector 32 unobstructed by target 30. Signal 28 was then emitted and similarly reached detector 32 obstructed. Light signal 22 reached target 30 next, also unobstructed. Currently, signal 24 is lit and has been blocked by target 30 before reaching detector 32. If the output of a single detector 32 disposed to receive all of the light signals in the array is monitored over time, the angular (and to a partial extent, the spatial) location of target 30 can be determined by the absence of a signal at the time the particular signal(s) are blocked.

[Tatum, paragraph 40] (Emphasis Added). Again, this embodiment of Tatum appears to determine which light signals are blocked or not blocked by the target object at any given time to determine the size/location of the target.

With respect to the embodiment of Figure 9, Tatum state:

> [0041] If optics are added, as depicted in FIG. 9, light signals can be steered into different angles. Light signals are shown passing through lens 30, positioned between VCSEL structure 2 and target 84. Lens 30 then

> redirects the light signals to different places in the environment, allowing a single detector 32 to sense targets 84 at widely separated locations. With only ten VCSEL elements, approximately, a full half-plane of 2.pi. steradians could be monitored.
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> [0042] In this example, light signals 28, 22, and then 24 have already been sequentially emitted, as denoted by the dotted lines, and light signal 26 is currently lit. After being redirected by lens 30, light signal 26 travels until it intercepts target 84. Light signal 26 then reflects off of target 84 and reaches detector 32. It should be noted that target 84 happened to be positioned in the environment such that it lay in the path of light signal 26, rather than light signal 26 specifically seeking target 84. If target 84 were moved, it would lie in the path of a different light signal.
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> [0043] With linear arrays, position of a target along an axis can be detected. One example of a "circular" array application could use a single lens above VCSEL structure 2. This lens could skew each signal into a different angle as the individual elements are sequentially illuminated. A light signal can, therefore, be directed to different areas in an environment at different times by simply illuminating different elements at different times. Measuring the temporal output of a detector disposed to collect reflected light signals can provide information on the presence of a target and of its location. Even if location information is not necessary, the effective scanning of a light signal without moving parts can provide for a purely electrical function rather than a mechanical function. This feature allows for operation at a much lower input power, which could be important in battery-powered applications where energy conservation is often critical.

[Tatum, paragraphs 41, 42 and 43] (Emphasis Added). While this embodiment does contemplate detecting light that is reflected off of the target, the location of the target is determined by directing light to different areas in the environment at different times by illuminating different VCSELS at different times. By measuring the temporal output of the common detector, information on the presence of a target and of its location may be determined. This, however, does not rely on or even use changes in surface textures (imperfections), which cause different spikes or pulses of light reflections from the surface of the target. Nor does this embodiment contemplate monitoring these pulse

frequencies to provide information on target velocity, as the Examiner suggests.

The Examiner is reminded that to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. [see, MPEP § 2112]. As noted above, the techniques described by Tatum do not appear to rely on, or even use, changes in surface textures (imperfections), which cause different spikes or pulses of light reflections from the surface of the target. Nor does Tatum appear to monitor these pulse frequencies to provide information on target velocity. As such, this subject matter cannot be inherent in Tatum. For the foregoing reasons, as well as other reasons, claims 1-3, 7, 13, 17, and 18 are all believed to be clearly patentable over Tatum. For similar and other reasons, dependent claims 4-6 and 10-12 are also believed to be clearly patentable over Tatum. Newly presented claims 19-26 are also believed to be clearly patentable over Tatum.

In view of the foregoing, Applicant believes that all pending claims 1-26 are in condition for allowance. Reexamination and reconsideration are respectfully requested. If the Examiner believes it would be beneficial to discuss the application or its examination in any way, please call the Applicant at (612) 359-9348.

Respectfully submitted,

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By their attorney,

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